REMARKS

Claims 1-4, 6, and 8-16 stand rejected under 35 USC §103(a) as being unpatentable over newly cited Gunlock et al., U.S. patent 6,952,734 in view of newly cited Berman, U.S. patent 7,012,914 and further in view of newly cited McCarty, U.S. patent 6,356,944, and further in view of newly cited publication T11/99-594v2. . Claims 2, 3, 17, and 18 stand rejected under 35 USC §103(a) as being unpatentable over Gunlock et al., U.S. patent 6,952,734 in view of newly cited Berman, U.S. patent 7,012,914 and further in view of newly cited McCarty, U.S. patent 6,356,944, and further in view of Haren, U.S. patent 6,557,060.

Reconsideration and allowance of each of the claims 1-4, 6 and 8-18, as presented, is respectfully requested. Applicants respectfully submit that each of the pending claims 1-4, 6 and 8-18, as presented, is patentable over the references of record.

Summary of Scope and Content of the Prior Art

Gunlock et al., U.S. patent 6,952,734 discloses a method and system with a node for a storage area network that has a processor, at least one port for connection to a storage area network, and a memory system. The memory system contains machine readable instructions for managing the at least one port, including instructions for determining a status associated with the at least one port capable of holding at least failed, probationary, normal and active status. For any failed port, the instructions include instructions for detecting a repair and when repair is detected for advancing the status to active or probationary status--probationary status being set when no exchange

is pending to a target node reachable only through the repaired port. For probationary ports, the instructions detect when the port operates without error for a predetermined period and advances the status from probationary to active or normal. Network exchanges are preferentially routed over an active or normal port, rather than transmitting them over probationary ports. Column 8, lines 1-48 states:

Detail of Network Topology Database Structure
Node Record Detail

A node record, such a node record 412, is shown in more detail in FIG. 6. Referring to FIGS. 6 and 4, included in the record are forward and reverse list pointers 600 for linking the record to the target node list pointers 418 and to other node records such as node record 414. There are also device-link list pointers 602 for accessing the list of device links, such as device links 420 and 422. The device-link list pointers 602 are therefore pointers through which associated device records may be located.

Each node record also has node information 604 about the corresponding node of the network, including node identity information. The node identity information includes the destination ID (D.sub.-- ID) 606 required for routing frames to the node, and node identifying information including a globally unique identifier 608 for the node and port. This identifier is unique among all the nodes of the storage area network. The node identity information may incorporate a node name 610. The globally unique identifier 608 may comprise the node name 610 and a port name associated with the HBA port record through which the node record is reachable since the combination of port name and node name is unique in the network. The node identity information permits determination of whether nodes logging in through a port have already been seen through another port. There may also be information for use in higher levels of protocol, such as a SCSI address 612 for use with SCSI-over-Fibre-Channel protocols.

The node information also has a number of fields used to manage command queues. These include a maximum queue depth 620 for the node, a current queue depth 622, a number of pending operations 624, a timer 626, and a queue depth decrement field 628 for logging the time of the most recent queue depth reduction due to a queue depth refusal.

Device Record Detail

A device record such as device record 430 has forward and reverse pointers 700 (FIG. 7) through which it is linked to the device list pointers 436 and other device records. There are also path link list pointers 702 to any associated list of path links, and device information 703. Included in the device information 703 is device identification 704, including a device name for user access to the device. The device identification 704 may also include unique device identification, such as device serial numbers. The device information 703 also includes any logical unit number 706 needed to reference the device, device type, status 707, and other device specific information

708 of interest to the driver.

Berman, U.S. patent 7,012,914 discloses methods and apparatus for Fibre Channel interconnection between a plurality of private loop devices through a Fibre Channel private loop device interconnect system. In the preferred embodiments, the Fibre Channel private loop device interconnect system is a fabric or an intelligent bridging hub. In one aspect of this invention, a Fibre Channel private loop device is connected to two or more Arbitrated Loops containing, or adapted to contain, one or more private loop devices. Preferably, the interconnect system includes a routing filter to filter incoming Arbitrated Loop physical addresses (ALPAs) to determine which Fibre Channel frames must attempt to be routed through the fabric. Numerous topologies of interconnect systems may be achieved. In another aspect of this invention, a method is provided for implementing a logical loop of private loop devices by segmenting the logical loop into a plurality of sets, assigning each set to a physical Arbitrated Loop and connecting the Arbitrated Loops to a Fibre Channel private loop device interconnect system. Additional methods are provided for restricting attached devices to Arbitrated Loop physical addresses within certain ranges. Additionally, methods are provided for resetting hosts, the method generally comprising the steps of detecting the addition of a storage device to a first Arbitrated Loop, and thereafter, resetting the Arbitrated Loop or loops on which a host or hosts reside on second Arbitrated Loop. Methods for operation with use of SCSI initiators generate a link service reject when no address match is found, or when an address match is found, but where no device with the destination ALPA exists on the Arbitrated Loop corresponding to the destination.

Column 11, lines 51-67 states and column 9, lines 13-20 provides the stated definitions:

1. Fabric Control Module

FIG. 14 shows the Fabric Control module (FCM) 454. The FCM configures the fabric, collects and reports network management parameters and implements the fabric defined servers such as the Simple Name Server, Directory Services, etc. The FCM configures the router 452, the port control modules 451, 474, 475 and the brouter module 455. FIG. 15 shows the Fabric Control module (FCM) in more detail. The FCM is made up of fast SRAM 482, DRAM 483, a DUART 484, flash memory 485 (nonvolatile storage), a processor 481 and a Decode/DMA Control module 487. The code for the processor is contained in the flash memory 485 and is copied to SRAM upon bootup. The interface to the brouter module 455 allows the FCM to communicate through legacy networks such as ethernet and fast ethernet, depending on the brouter module.

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"Link Services Reject" or LS_RJT is a Fibre Channel Extended Link Service Command defined in the FCPH Revision 4.3 ANSI standard that notifies the transmitter of a Link Service request that the Link Service request Sequence has been rejected.

LS_RJT frames may be transmitted for a variety of conditions which may be unique to a specific Link Service Request.

McCarty, U.S. patent 6,356,944 discloses a system with a plurality of devices compatible with the Fiber Channel Protocol, with at least one initiator/originator and one target/responder. The initiator/originator is provided with the capability to send both data and command frames to the target/responder to increase write performance. The target/responder allocates a portion of its Responder-Exchange-Identifiers for the write use of the initiator/originator, which manages the use of these identifiers. Column 9, lines 38-61 states:

The initiator FC devices can initiate a Link Service Command/Frame after all AL_PA assignment issues have been resolved. Link Service Frames include both "request" and "response" frames. Request frames are those Link Service Frames which require a receiving device to send back a response frame and include, among others, Login Link Service Frames (PLOGI), Logout Frames (PLOGO), Discover N_Port Service Parameters Frames (PDISC), Discover Address Frames (ADISC), Process Login Frames (PRLI), Process Logout Frames (PRLO), and Reinstate Recovery Qualifier Frames (RRQ).

In a single initiator environment, the initiator device sends out Link Service Frames as needed and expects in response thereto an Acknowledgment Frame (LS_ACC) or a Reject Frame (LS_RJT). Further, the initiator device keeps track of the type of Link Service Frames that are sent out by storing the type information (hereinafter "type information element") for each Link Service Frame in a storage array called outstanding link_services_array. Typically, this outstanding link_services_array comprises a plurality of storage locations each of which corresponds to a recipient device's AL_PA. Moreover, in typical embodiments, all Link Service Frame types are stored for each recipient as they are sent out.

The newly cited publication T11/99-594v2 discloses Request Topology Information (RTIN) extended link service function allowing node specification information to be provided to in-band management software.

Haren, U.S. patent 6,557,060 discloses a host expansion bridge where data is converted from a first granularity to a second granularity different from the first granularity. The ratio "n" of the second granularity of the data to the first granularity of the data is determined as a power of 2. The least significant n bits of the beginning alignment of the data are added to the least significant n bits of the beginning count of the data, and the carry bit of the sum is designated as "c". A logical "OR" is performed of the bits of the resulting sum to obtain a value designated as "d". A number of data units, equal to the sum of "c" and "d", is added to the data. Column 4, lines 1-28 states:

A software stack may be provided in channel adapter 119 or 119' to access the network switching fabric 100 and information about fabric configuration, fabric topology and connection information. The operating system software (OS) of the processing system 110 may include a fabric bus driver and a fabric adapter device-specific driver utilized to establish communication with a remote fabric-attached agent (e.g., I/O controller) of another processing system connected to the network, and perform functions common to most drivers, including, for example, host-fabric adapter initialization and configuration, channel configuration, channel abstraction, resource management, fabric management service and operations, send/receive I/O transaction messages, remote direct memory access (rDMA) data transfers (e.g., read and write operations), queue management, memory registration, descriptor management, message flow control, and transient error handling and recovery. Such a software

driver module may be written using high-level programming languages such as C, C++ and Visual Basic, and may be provided on a tangible medium, such as a memory device, magnetic disk (fixed, floppy, and removable), other magnetic media such as magnetic tapes; optical media such as CD-ROM disks, or via Internet download, which may be available for a network administrator to conveniently plug-in or download into an existing operating system (OS). Such a software driver module may also be bundled with the existing operating system which may be activated by a particular device driver.

Claims 1, and 11 are patentable

Applicants respectfully submit that each of the independent claims 1 and 11, as amended, is patentable over all the references of record including Gunlock et al., Berman, McCarty, Haren, and publication T11/99-594v2.

The present invention, as recited in independent claims 1 and 11, as presented, provides a novel storage area network (SAN) management and configuration method and apparatus via enabling in-band communications that solves a problem of some existing SAN arrangements. A problem exists in some known storage area network arrangements, for example, in a serial storage architecture (SSA), device driver writers and host based adapter (HBA) vendors provide a complex set of micro code calls. A management program would then interrogate the HBA, using micro code calls specific to the particular HBA vendor and model, then interpret the results in a way that is specific to that particular HBA vendor and model. One problem with this arrangement is that an in-depth understanding is needed for every HBA model of every vendor, which in the case of Fibre Channel, is impractical. There are too many vendors and too many models to implement this approach. The present invention, as recited in independent claims 1 and 11, as amended, provides a pass through in said HBA device

driver for passing communications to a device in the storage area network from said SAN management application, including at least one topology analysis command, and at least a transport pass through and an extended link service (ELS) pass through; each of said transport pass through and said extended link service (ELS) pass through being a binary pass through, each taking applied commands and passing said commands to said designated device in the storage area network as recited in amended independent claims 1 and 11.

Independent claim 1, as presented, recites a storage area network (SAN) management and configuration method via enabling in-band communications comprising the steps of: utilizing a SAN management application for managing and configuring the storage area network; said SAN management application communicates with at least one SAN-connected host system and communicates with a host bus adapter (HBA) device driver, and providing a pass through in said HBA device driver for passing communications to a designated device in the storage area network from said SAN management application including at least one topology analysis command; said at least one topology analysis command including a command to get interconnect information and a command to get topology information; and providing said pass through includes providing at least a transport pass through and an extended link service (ELS) pass through; each of said transport pass through and said extended link service (ELS) pass through being a binary pass through, each taking applied commands and passing said commands to said designated device in the storage area network.

As presented, independent claim 1 further defines the transport pass through and the extended link service (ELS) pass through, reciting that each of said transport pass through and said extended link service (ELS) pass through being a binary pass through, each taking applied commands and passing said commands to said designated device in the storage area network.

Applicants respectfully submit that the references of record including Berman provide no suggestion nor motivation for providing a pass through including the transport pass through and the extended link service (ELS) pass through in said HBA device driver that are binary pass throughs, each taking applied commands and passing said commands to said designated device in the storage area network, as taught by Applicants and recited in independent claim 1. Berman provides no suggestion nor motivation for any pass throughs taking applied commands and passing said commands to said designated device in the storage area network, as taught by Applicants and recited in independent claim 1. Thus, independent claim 1, as presneted, is patentable.

Independent claim 11, as amended, recites a storage area network (SAN) management and configuration apparatus via enabling in-band communications comprising: a storage area network (SAN) management application for managing and configuring the storage area network via enabling in-band communications, said SAN management application for communicating with at least one SAN-connected host system; said SAN-connected host system including a management application agent for communicating with a host bus adapter (HBA) device driver; said HBA device driver for

communicating with a device in the storage area network; said HBA device driver including at least one pass through service for passing a plurality of commands to said device in the storage area network; said commands including at least one topology analysis command; and said at least one topology analysis command including a command to get interconnect information and a command to get topology information; said pass through including at least a transport pass through and an extended link service (ELS) pass through; each of said transport pass through and said extended link service (ELS) pass through being a binary pass through, each taking applied commands and passing said commands to said designated device in the storage area network.

The references of record including including Gunlock et al., Berman, McCarty, Haren, and publication T11/99-594v2, considering the total teachings in combination, fail to suggest a storage area network (SAN) management and configuration apparatus via enabling in-band communications comprising a HBA device driver for communicating with a device in the storage area network; said commands including at least one topology analysis command and said HBA device driver including at least one pass through service for passing a plurality of commands to said device in the storage area network; and each of said transport pass through and said extended link service (ELS) pass through being a binary pass through, each taking applied commands and passing said commands to said designated device in the storage area network. Thus, independent claim 11, as amended, is patentable.

Applicants respectfully submit that all the references of record including including Gunlock et al., Berman, McCarty, Haren, and publication T11/99-594v2, do not render obvious the claimed invention and each of the independent claims 1 and 11, as presented, is patentable. No objective teaching in the prior art or knowledge generally available to one of ordinary skill in the art suggests the claimed subject matter of independent claims 1 and 11. The references of record including including Gunlock et al., Berman, McCarty, Haren, and publication T11/99-594v2, fail to suggest or provide any objective teaching of a storage area network (SAN) management and configuration method and apparatus via enabling in-band communications as taught and claimed by Applicants in each of the independent claims 1 and 11.

Applicants respectfully submit that the teachings or suggestions found in the prior art including Gunlock et al., Berman, McCarty, Haren, and publication T11/99-594v2, would not have been led one of ordinary skill in the art to the claimed invention. Applicants respectfully submit that each of the independent claims 1 and 11, as amended, is patentable.

Dependent claims 2-4, 6, 8-10, and 12-18 respectively depend from patentable independent claims 1 and 11 and further define the invention. Thus, each of the dependent claims 2-4, 6, 8-10, and 12-18 is likewise patentable.

Applicants have reviewed all the art of record, and respectfully submit that the claimed invention is patentable over all the art of record, including the references not relied upon by the Examiner for the rejection of the pending claims.

It is believed that the present application is now in condition for allowance

and allowance of each of the pending claims 1-4, 6 and 8-18, as presented, is respectfully requested. Prompt and favorable reconsideration is respectfully requested.

If the Examiner upon considering this amendment should find that a telephone interview would be helpful in expediting allowance of the present application, the Examiner is respectfully urged to call the applicants' attorney at the number listed below.

Respectfully submitted,

S-signature by

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